

5-9

Skills Practice

Complex Numbers

• Do circled problems
* Be sure to show work for at least # 10-20.

Simplify.

1. $\sqrt{-36}$

2. $\sqrt{-196}$

3. $\sqrt{-81x^6}$

4. $\sqrt{-23} \cdot \sqrt{-46}$

5. $(3i)(-2i)(5i)$

6. i^{11}

7. i^{65}

8. $(7 - 8i) + (-12 - 4i)$

9. $(-3 + 5i) + (18 - 7i)$

10. $(10 - 4i) - (7 + 3i)$

11. $(2 + i)(2 + 3i)$

12. $(2 + i)(3 - 5i)$

13. $(7 - 6i)(2 - 3i)$

14. $(3 + 4i)(3 - 4i)$

15. $\frac{8 - 6i}{3i}$

16. $\frac{3i}{4 + 2i}$

Solve each equation.

17. $3x^2 + 3 = 0$

18. $5x^2 + 125 = 0$

19. $4x^2 + 20 = 0$

20. $-x^2 - 16 = 0$

21. $x^2 + 18 = 0$

22. $8x^2 + 96 = 0$

Find the values of m and n that make each equation true.

23. $20 - 12i = 5m + 4ni$

24. $m - 16i = 3 - 2ni$

25. $(4 + m) + 2ni = 9 + 14i$

26. $(3 - n) + (7m - 14)i = 1 + 7i$

Study Guide

Complex Numbers

Pure Imaginary Numbers	
Definition	Example
For any positive real number b , $\sqrt{-(b^2)} = \sqrt{b^2} \cdot \sqrt{-1}$ or bi , where i is the imaginary unit and bi is called a pure imaginary number.	Simplify $\sqrt{-24}$. $\sqrt{-24} = \sqrt{24}\sqrt{-1}$ $= \sqrt{4 \cdot 6}i$ $= 2i\sqrt{6}$

Do circled problems

Numbers such as $6i$ and $13 + i$ are complex numbers. Use this chart as a guide to understanding addition, subtraction, and multiplication of complex numbers.

Definition or Process	Example
To add or subtract complex numbers, combine their real parts and combine their imaginary parts. $(a + bi) + (c + di) = (a + c) + (b + d)i$ $(a + bi) - (c + di) = (a - c) + (b - d)i$	$(2 + 7i) + (5 - 4i) = (2 + 5) + (7 - 4)i$ $= 7 + 3i$ $(7 - 4i) - (4 - 2i) = (7 - 4) + [-4 - (-2)]i$ $= 3 + (-2)i$ $= 3 - 2i$
To multiply complex numbers, use the FOIL method. $(a + bi)(c + di) = (ac - bd) + (ad + bc)i$	$(2 + 4i)(5 - 3i) = 2 \cdot 5 + 2 \cdot (-3i) + (4i) \cdot 5 + (4i) \cdot (-3i)$ $= 10 - 6i + 20i - 12i^2$ $= (10 + 12) + (-6i + 20i)$ $= 22 + 14i$

Simplify.

1. $\sqrt{-98}$

2. $\sqrt{\frac{-252}{4}}$

3. $\sqrt{-\frac{25}{121}}$

4. $(-3\sqrt{-5})^2$

5. $3i \cdot 6i^3$

6. $(2i \cdot 3i^2)^2$

7. $2i \cdot (4i^3)^2$

8. $\sqrt{-4} \cdot \sqrt{-9}$

9. $(-i)^3(i^2)^3$

10. $(7 + 5i) + (-4 - 6i)$

11. $(4 + 6i) - (2 - 7i)$

12. $(3 + 2i)^2$

13. $(5 - 3i)(5 + 3i)$

14. $i(5i) + i(7 - i)$

15. $2(3 + 2i) + 3(1 - i)$